



Broadleaved Trees

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Broadleaved Trees of Yosemite National Park

By C. FRANK BROCKMAN

INTRODUCTION

This booklet, designed as a companion to "Cone-bearing Trees of Yosemite," will aid Park visitors in the completion of a study of the trees of this area. Although the forests of Yosemite National Park are primarily coniferous (1), one will find a number of broadleaved species which embody specific interest due to the character of their spring floral display, their form, the odor of their foliage, the color of their foliage in the fall, the nature or color of seeds and the manner of seed dispersal, their habitat, and similar factors. These things render them conspicuous, thus serving to highlight the

otherwise sombre nature of our coniferous forests. Furthermore, it will be obvious even to a casual observer that there is a considerable concentration of broadleaved trees in Yosemite Valley which, although but a small part of Yosemite National Park, is the section most frequented by the majority of visitors. Thus, to a large number of people, the broadleaved trees attract attention out of proportion to their relative abundance in Yosemite forests.

The California black oak, which occurs in abundance in the Valley, is of significant importance in this regard, particularly in the fall when

(1) Thirty-five species of trees grow naturally in Yosemite National Park. Eighteen, the greater part of this number, are broadleaved. However, while this group is in the majority insofar as number of species is concerned, Yosemite forests are essentially coniferous in type, being dominated by the sixteen species of cone-bearing trees which are found here in much greater abundance. In addition the California torreyia (*Torreya californica*), which possesses needle-like, evergreen foliage but which is not a cone-bearing tree, is native to Yosemite National Park. Because of the similarity of its foliage to that of many conifers a description of that species will be found in the booklet on cone-bearing trees.

Attention should also be called to those trees which are not native to the Park but which were introduced into the area during the pioneer period. Included in this category are the American elm, black locust, sugar maple, and a number of varieties of fruit trees—largely apple. The latter are found principally in three orchards on the Valley floor which were planted during the 60's by James C. Lamon and James M. Hutchings, early settlers in this area. (See page 30).

the acorns are conspicuous features, and when its foliage assumes the rich golds and browns characteristic of the season. Likewise the Pacific dogwood is distinctive, not only in the spring when it is festooned with numerous large white blossoms, but also in the fall when it bears clusters of bright red seeds, and when the foliage takes on a characteristic autumnal red. Other species possess outstanding characters of a similar nature which attract their share of visitor interest. The foliage of the California laurel gives off a penetrating, pungent odor when bruised; the holly-like leaves of the canyon live oak rarely fail to attract attention; and the quivering of the long-stemmed leaves of the aspen is a familiar sight in the "high country."

Leaf Fall and Autumnal Color of Foliage

With few exceptions the broad-leaved trees of Yosemite National Park lose their leaves in the fall. This, and its related phenomena, is the result of the tree's preparation for winter for as the season approaches, deciduous trees must necessarily be ready to withstand its rigors. These preparations are largely to prevent excessive transpiration, since abnormal loss of water may result in the death of the tree. They are responsible for the vivid fall colors characteristic of the foliage of many deciduous trees, the annual loss of foliage, and the development of many features useful in winter identification.

During the summer the leaves serve as places of food manufacture. As autumn approaches, practically everything of nutritive value to the

tree is gradually transferred to other parts and the leaves soon become mere skeletons, their cells containing only pigments which are of no further use. These pigments are responsible for the fall colors.

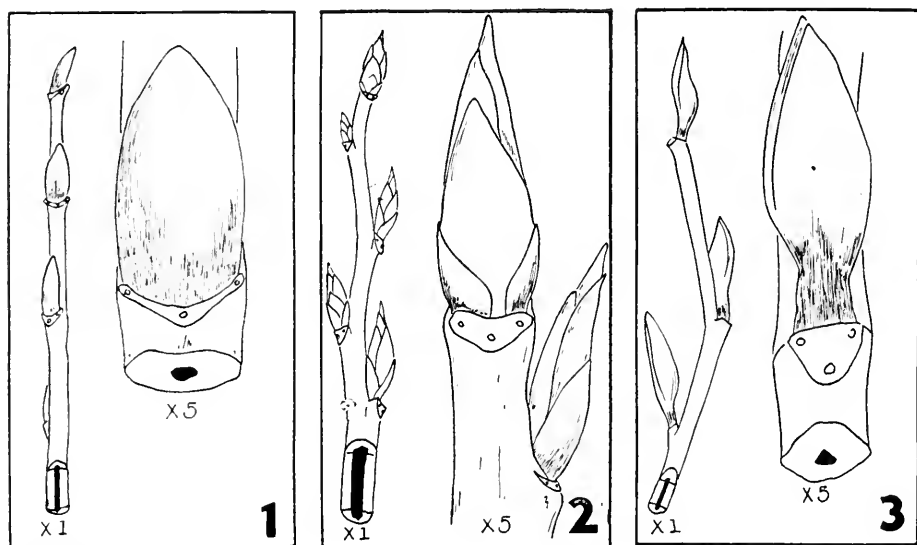
Leaf fall, most obvious of the deciduous tree's preparation for winter, is anticipated weeks before the occurrence of this event. By midsummer a layer of loose cells begins to form across the base of the leaf stem. When complete it extends entirely across the stem at the point where it joins the twig, except for the vascular bundles which must necessarily remain open to facilitate the transportation of food and moisture. Subsequently an additional layer of corky cells form under the one previously developed. With the advent of fall, with its rains and frosty nights, small crystals of ice develop between the two cell layers. These exert a prying action which snaps the leaf from the twig. The leaf scar, which would otherwise have remained as an open wound, is protected by the corky cell layer.

However, this is but one episode in the tree's preparation for winter. By midsummer the buds, conspicuous on the naked twigs in winter, are formed. These contain the rudimentary foliage or flower parts destined for development in the following summer which are protected by scales, waxes, gums, or hairs. In addition growth is retarded and finally ceases, the recently formed tissues are "hardened," and the bark of the twigs and branches is increased in thickness through the addition of corky tissue.

Identification of Deciduous Trees In Winter

Such preparations are responsible for the development of a variety of features by means of which one may readily identify deciduous trees in winter primarily by an examination of the naked twigs. Varying with the species, in a manner similar to the more familiar foliage, flowers, or fruits, one finds buds of distinctive form and protective devices placed in typical positions on the twigs, leaf scars of distinctive size and shape with their vascular bundle scars

(from one to many) arranged in specific patterns upon the surface, and stipule scars which are present on the twigs of certain species. In addition one may note the color, taste and odor of the twig, the nature and number of the lenticels in the bark, the color and character of the pith found in the central portion of the twig, and the bark itself. The form of the tree is also of assistance in winter identification. This has many variations, from an upright pattern (as in the case of the Pacific dogwood) wherein the trunk or central



From drawing by C. Frank Brockman

1. **WILLOWS.** Twigs slender, round in cross section. Leaf scars alternate, U-shaped and narrow, with three bundle scars. Buds sessile (not stalked), small, oblong and with but one exposed bud scale. Pith round in cross section and small.

2. **BLACK COTTONWOOD.** Twigs moderately stout, slightly angular in cross section. Leaf scars large, alternate, broadly crescent shaped to triangular, with three bundle scars. Buds sessile, elongated, conical, gummy and fragrant, with 6-7 overlapping scales. Pith rather small, somewhat 5-angled in cross section.

3. **WHITE ALDER.** Twigs slender, somewhat 3-sided in cross section. Leaf scars alternate; half round, raised, with three bundle scars. Buds large and stalked, with 2-3 reddish-brown valvate (not overlapping) scales.

axis of the tree is continued through the crown, to a wide-spreading type (as in the California black oak) in which case the trunk divides into several large limbs.

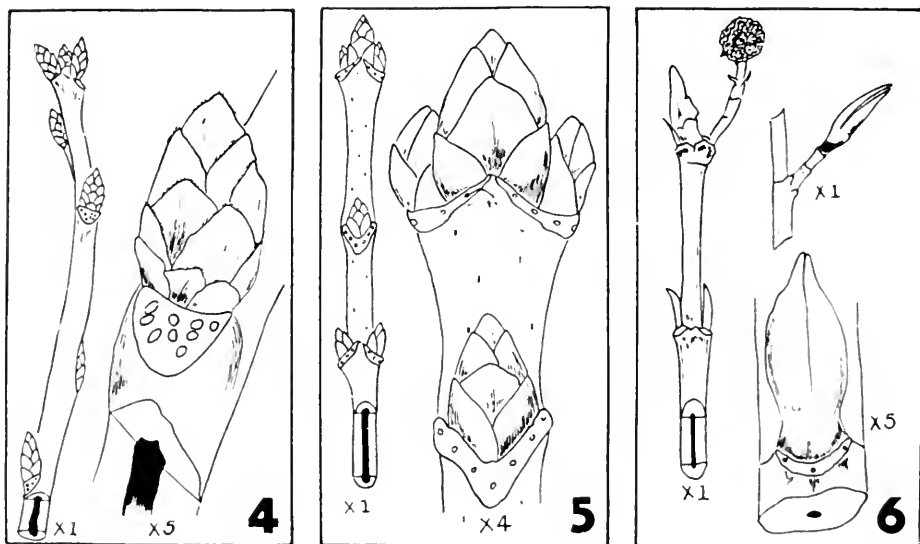
Beauty of Deciduous Trees In Winter

The beauty of our deciduous trees in winter should not be overlooked. Even though devoid of foliage at that time the rigors of that season lend a distinctive charm to these trees. This is of particular importance in areas such as Yosemite Valley. Here, after a snow storm, the naked branches of

the California black oak are often sheathed with a coating of snow which presents a glistening pattern against the background of a blue Sierra sky. On such occasions these trees contribute, in no small measure, to the development of a veritable fairyland of exquisite beauty.

Plan and Organization of This Publication

The descriptions of the broadleaved trees found in Yosemite National Park, as noted on the following pages, are presented in a style designed primarily for the layman. In



From drawing by C. Frank Brockman

4. CALIFORNIA BLACK OAK. Twigs moderate to slender, often fluted. Leaf scars alternate, moderate to small in size, half round and somewhat raised, with numerous bundle scars. Clusters of several buds at tip of twig; lateral buds solitary. Buds sessile (not stalked) with overlapping scales arranged in five ranks. Pith small and somewhat star-shaped in cross section.

5. BIGLEAF MAPLE. Twigs stout. Leaf scars opposite, U-shaped, and with 5-9 bundle scars. Buds sessile, stout, blunt, with 3-4 pairs of overlapping scales. Several buds clustered at tip of twig; lateral buds solitary.

6. PACIFIC DOGWOOD. Twigs slender. Leaf scars opposite, narrow, crescent or U-shaped with three bundle scars. Leaf scars encircle twig, are commonly raised during first winter on petiole bases—later sluff off at level of twig. Buds solitary, stalked, oblong, with pair of valvate scales.

addition to the descriptive text, with accompanying illustrations, a simple field key (see page 37) is also included to serve as an aid in quick iden-

tification. For those who wish to pursue this subject to greater lengths the list of selected references (see page 40) will be of particular value.

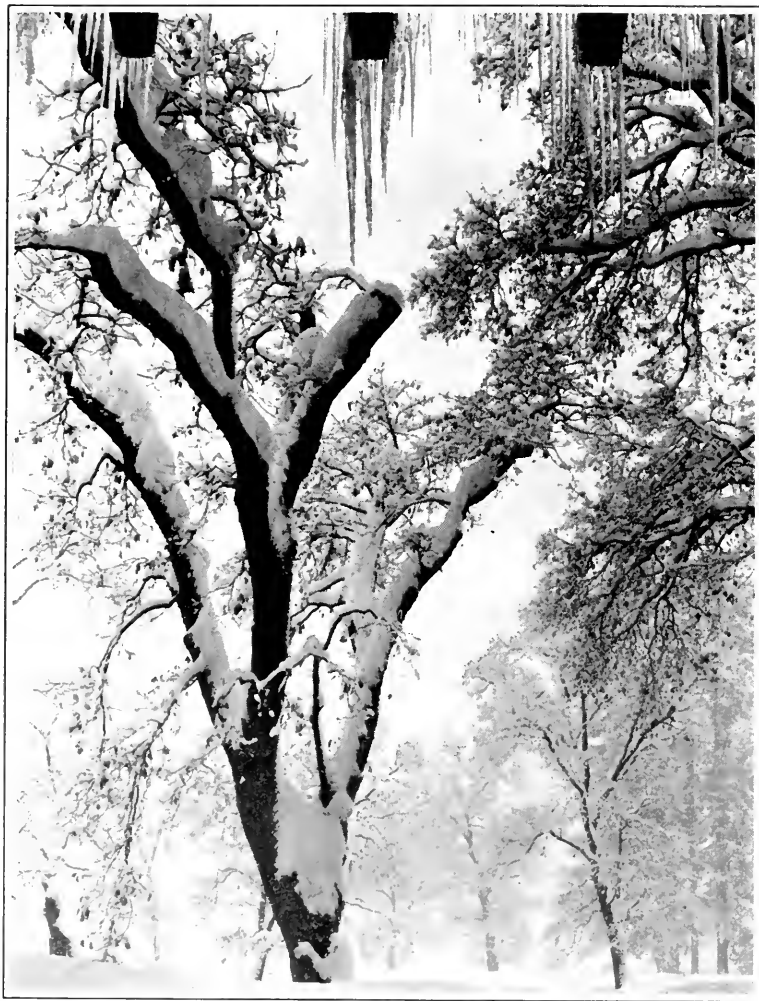


Photo by Ansel Adams

Yosemite Valley oaks in winter

WILLOWS

Salix spp. — Willow Family — (Salicaceae)

Although about fifteen species of willows are native to Yosemite National Park, where they are found growing from the low foothill zone to the frigid upper slopes of the Sierra peaks within the Arctic-alpine Zone (1), but three species can be considered as attaining tree stature. These are the **Pacific willow** (*Salix lasiandra* Benth.), also known as the yellow or western black willow, the **red willow** (*Salix laevigata* Bebb.), also known as the polished or smooth willow, and the **Scouler willow** (*Salix scoul-*

eriana Barrett). The first named is perhaps the most common. It can be readily found along the banks of the Merced River in Yosemite Valley (2).

This is a difficult group of plants and the person not trained in botany will have difficulty in determining the various species. However, as a group they possess certain well defined and readily recognized characters with which most people are familiar and which can be readily noted even by casual observation. Thus, to most people the identity of

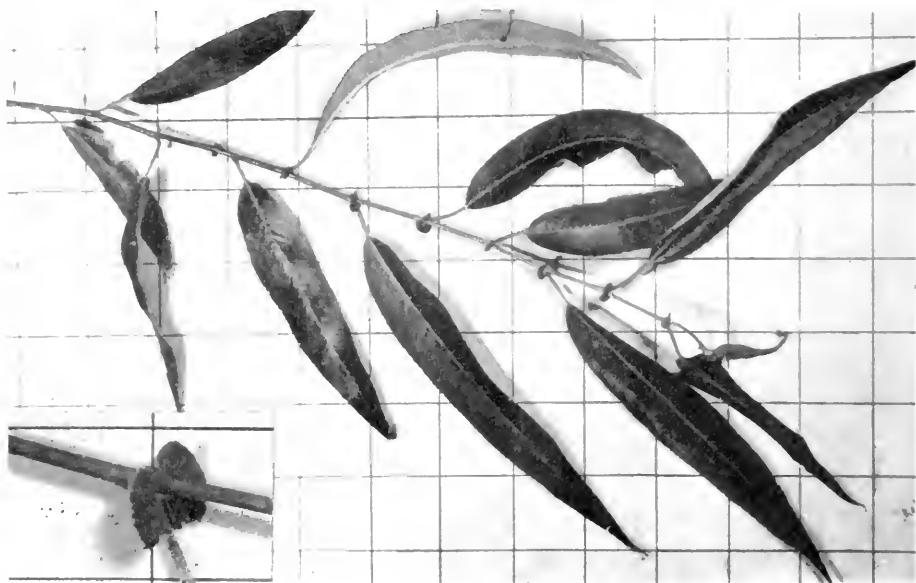


Photo by Brockman

Typical willow foliage (Inch squares on background)

(1) Alpine willow (*Salix petrophila caespitosa*) is one of the more interesting high altitude plants of Yosemite National Park. It is rarely more than 4-6 inches high and can be found on moist slopes in the vicinity of timberline.

(2) Three others—the heartleaf willow (*Salix cordata*), the arroya willow (*Salix lasiolepis*), and the Hind's or sandbar willow (*Salix hindsiana*) sometimes assume the stature of tall shrubs and may occasionally be regarded as small trees.

"willow" is usually sufficient and this group is treated in that fashion.

All willows are deciduous trees or shrubs with simple, alternate leaves. The staminate (male) and pistillate (female) flowers are borne on different trees in narrow, elongated clusters known as catkins. The fruit is a capsule which contains many seeds, each bearing a tuft of hairs at the base, by means of which the seeds are dispersed by the wind. The bark has a bitter, quinine-like flavor. The leaves, which are generally elongated, have a pair of peculiar ear-shaped growths (stipules) at the base of the leaf stems. The buds are distinctive in that they are characterized by a single bud scale. The leaf scars,

left upon the twigs after the foliage has dropped in the autumn, are U-shaped and narrow with three vascular bundle scars upon the surface. The buds, with their single scale, and the leaf scars are particularly good characters for winter identification.

The twigs of various species of willow were once widely used by the Indians of the Yosemite region in the manufacture of many types of baskets.

For detailed, specific descriptions of the various species of willows found in this region the reader is referred to the several texts noted in the list of selected references on page 40.

BLACK COTTONWOOD

***Populus trichocarpa* Torr. & Gray — Willow Family (Salicaceae)**

Although not a tree of particular beauty, the black cottonwood is one of the most easily recognized of our broadleaved trees. It is rarely found above 4,500 feet and is common in the Yosemite Valley, Wawona, and Hetch Hetchy areas where it grows along streams or in moist meadows. Numbers of fine specimens can be readily found along the Merced River in Yosemite Valley. Several are growing on the bank of Yosemite Creek which borders the cabin area of Yosemite Lodge.

Young trees, as well as the branches and upper trunk of mature specimens, are characterized by smooth, pale gray bark which assumes a dark gray, heavily ridged and furrowed character on old trunks. In the latter

case the bark is occasionally as much as two inches thick. The larger trees, which may attain an age of from 60 to 90 years, are 80 to 90 feet tall and from two to three feet in diameter. In most instances the trunks are free of branches for a distance of from one-half to two-thirds of their height, with a short, ragged, open crown characterized by heavy, upright branches. These branches are quite brittle, or "brash," and often snap off during periods of high wind or heavy snow.

The thick, leathery leaves, finely toothed along the edges, are from two to seven inches long, broad at the base and tapering to an acute point. They are shiny green on the upper side, pale to silvery-white beneath,

and are further characterized by large, conspicuous veins. Mid-veins, and often the slender round leaf stems, are sometimes slightly hairy. In the fall before dropping from the tree the leaves assume a dull, yellowish-brown color which, although suffering by comparison with the fall color of the California black oak and Pacific dogwood, nevertheless adds a note of interest to our fall color display.

Perhaps its most interesting characters are the flowers and seeds. Staminate (male) and pistillate (female) flowers are borne on different trees. The former, which bear the pollen, are produced in great numbers in dense, pendent, tassel-like clusters (aments) one to two inches long. The latter, also borne in pendent aments, are more loosely clus-



Photo by Anderson

Black cottonwood in Yosemite Valley

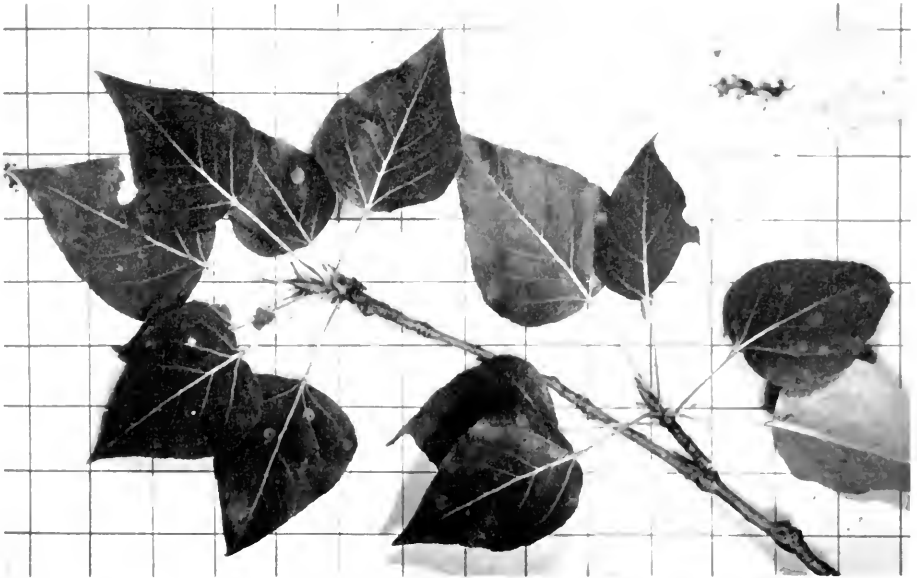


Photo by Brockman

Foliage and seeds of black cottonwood (Inch squares on background)

tered. At maturity they are four or five inches long and appear as grape-like clusters of round, green globules, each one containing a multitude of tiny, brown seeds to which are attached a number of soft, cottony filaments by means of which the seeds are wind dispersed. It is to this character that the tree owes its name. In midsummer when the green seed-laden capsules open, the air is filled with these wind-borne seeds and the ground in the vicinity of these trees is often covered with a thick, downy carpet of "cotton."

The twigs are slender to moderately stout, sometimes slightly angular, and vary in color from orange-brown to greenish-brown. The buds, similarly colored, are as much as three-quar-

ters of an inch long, narrowly conical with six or seven overlapping scales, but their most distinctive characteristic is the presence of gummy, fragrant resin. Leaf scars which, with the twigs and buds, assist in winter identification of this tree are large and conspicuous, being slightly raised, broadly crescent-shaped to triangular in outline (sometimes three-lobed), and alternate, with three large vascular bundle scars appearing thereon.

The natural range of the black cottonwood includes an extensive area of the Pacific west — from southern Alaska and the Yukon south through British Columbia, Washington, and Oregon to southern California.

QUAKING ASPEN

***Populus tremuloides* Michx. — Willow Family (Salicaceae)**

As one of the most interesting trees of the higher elevations in the park, the aspen is rendered conspicuous by the character of its bark, which is generally smooth and white, and the habit of the leaves quivering in the slightest breeze.

Park visitors who remain on the Valley floor will not have the pleasure of observing the graceful beauty of this tree for it is found in the Canadian and Hudsonian Zones, rarely growing below 5,000 feet. It will be most readily noted along the Tioga Road in the vicinity of Yosemite Creek, on the Glacier Point Road near Bridalveil Creek or in the vicinity of Badger Pass, along the trail between

Nevada Falls and Merced Lake, about Washburn Lake, and between Glen Aulin and Waterwheel Falls. Aspen Valley owes its name to the groves of this species in that area.

Although generally smooth and white (sometimes with a cream-colored or light green cast), the bark is often marked with numerous black, wart-like protuberances. On older trees it is generally rough and dark brown at the base. The slender limbs are irregularly bent and stand out straight from the trunk. Where aspens are found in the open the limbs form a loose, narrow, dome-like crown that extends throughout most of the tree's height. However, the aspen is very

intolerant of shade and under crowded conditions it produces a very long, slender trunk with a small rounded crown occupying but the upper third of the tree's height.

It prefers moist, sandy, mineral soils and thus is most commonly found along streams and canyon bottoms where it often forms attractive groves. Under such conditions it rarely fails to gain the admiration of the passerby for what it lacks in size it overcomes in grace and beauty.

The aspen is not a large tree, the maximum height being about 50 to 60 feet and the diameter 12 to 30 inches. It is also short-lived, rarely being more than 50 to 60 years old. Trees 10 to 14 inches in diameter

average about 30 to 40 years of age.

The leaves, almost round in outline and ending in a definite point at the apex, are one and one-half to three inches in diameter, and edged with small, regular serrations or teeth. They are shiny and smooth, deep yellow-green above and lighter on the underside. The most distinctive character of the leaves, however, is their habit of fluttering in the slightest breeze. The reason for this is readily accounted for by the long leaf stem or petiole (one and one-half to three inches in length) which is flattened from the sides. The specific name, **tremuloides**, was applied because of the quivering habit of the leaves. It also accounts for the common name of quaking aspen.

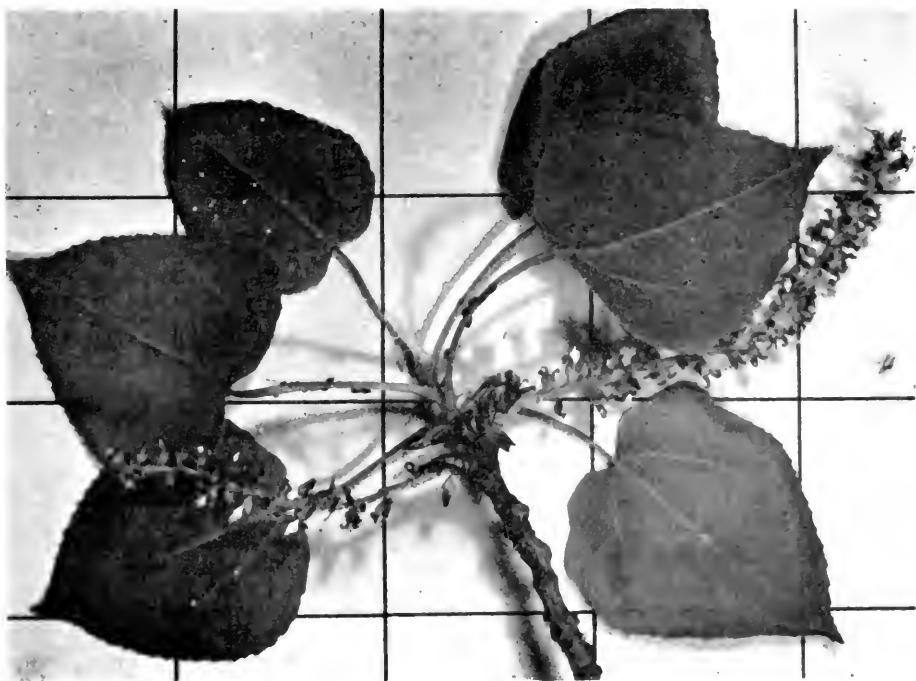


Photo by Brockman

Foliage and flowers of quaking aspen (Inch squares on background)

Interesting at any time of the year because of its many outstanding characteristics, it is at its best in the fall. At that time the sombre, green clad mountainsides of the upper elevations are enlivened by brilliant patches of bright golden yellow and orange as the foliage of the aspen assumes its characteristic brilliant shades preparatory to dropping from the tree in anticipation of the winter season. Fall arrives early at altitudes frequented by the aspen, being at its height in September with the first signs of autumn occasionally being evident as early as late August.

As in the case of all members of the willow family the staminate (male) and pistillate (female) flowers of the aspen are borne on separate trees, occurring as pendent, tassel-like clusters (aments). Staminate clusters are one and one-half to two and one-half inches long; pistillate clusters are four inches long at maturity, bearing numerous elongated capsules containing many tiny seeds attached to conspicuous cottony filaments which aid in the dissemination of the seeds by the wind.

It is one of the most widely distributed North American trees, occurring



Photo by Anderson

Bark detail on aspen

from the northern-most extent of tree growth from Labrador westward to Alaska, and southward at progressively higher elevations into the southern Sierra Nevada and Rocky Mountain regions.



WHITE ALDER***Alnus rhombifolia* Nutt. — Birch Family (Betulaceae)**

This is one of the most common trees of the Transition Zone where it is found in considerable abundance in moist sandy soils bordering streams, up to 4,500 feet in elevation. It is particularly common at Happy Isles, about Mirror Lake, in many places along the banks of the Merced River in Yosemite Valley, while Alder Creek near Wawona owes its name to the abundance of these trees at certain locations along its course.

The white alder can be readily identified by its smooth, steel-gray bark (on young trees) which become scaly and ridged with age, and the conspicuous, cone-like features—one-quarter to one-half inch long—which

bear the seeds, and which are known as strobiles.

The leaves are alternate on the branches, are large (one and one-half to two inches wide and from two to three inches long), a dark lustrous green on the upper surface, ovate in outline with coarsely toothed margins and prominent veins extending to the margins.

Both staminate and pistillate flowers, while borne in separate clusters, are found on the same tree. Both are partially formed in the summer previous to maturity. The former are contained in long, pendent, tassel-like clusters which are very conspicuous in the late winter and early spring

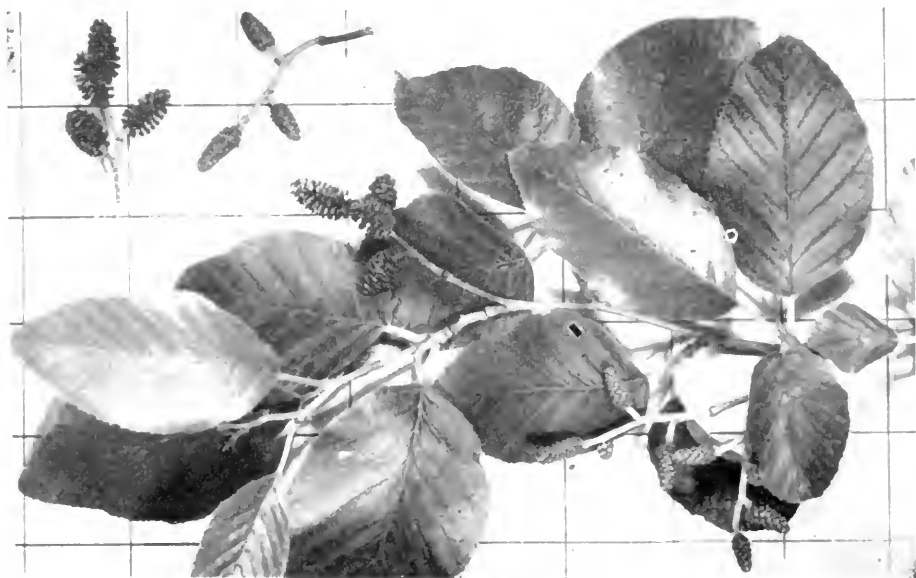


Photo by Brockman

Foliage and strobiles of white alder (Inch squares on background)



Photo by Brockman

Bark of mature alder

before the opening of the leaves. At that time they are from four to six inches in length. The latter first appear as small green affairs contained in loose clusters of three to four in number, later enlarging to oblong compact, green "cones." At that time they are about one-half inch in length. The white alder is a prolific seed producer. The seeds, contained between the scales of the strobiles, are mature by midsummer but are not liberated until the following winter, or even spring. At that time the "cones" are hard, woody, and black. After liberating the seeds they often litter the ground below the trees or

remain hanging from the branches for a considerable time, thus furnishing a ready clue to the identity of the white alder throughout most of the year.

Newly produced twigs are smooth, chestnut-brown in color, more or less triangular in cross section, and characterized by widely separated, elongated specks. The crown is broad and open with long branches, drooping toward their ends, extending from the trunk.

One of the best characters for winter identification of the white alder are the large buds. They are produced alternately on the twigs, and like all alders, are stalked. No other broad-leaved tree in Yosemite National Park has stalked buds. In addition to this distinctive feature, the buds are dark brown to dull red in color, are coated with a light colored fuzz, and the scales, instead of being numerous and overlapping, are only two or three in number and valvate in character. The leaf scars, somewhat raised and half round in outline, are characterized by three vascular bundle scars.

It is a tree of rapid growth, and because it can endure considerable competition, often forms dense thickets. It is not a long-lived species and soon attains a maximum diameter of 12 to 15 inches and a height of about 50 feet. Trees of maximum size are rarely over fifty years of age.

CALIFORNIA BLACK OAK***Quercus kelloggii* Newb. — Beech Family (Fagaceae)**

Park visitors should have no difficulty recognizing this tree. It is not only one of the most distinctive and beautiful trees in the park, but in its resemblance to the eastern black oak it possesses many of the characters typical of the oak group with which most people are familiar. It grows on benches and valley bottoms in dry, gravelly to sandy soils, from 3,000 to 5,000 feet above sea level. It is one of the most common trees on the floor of Yosemite Valley where it forms picturesque groves of great charm and beauty. Here in autumn the rich color of its foliage, which ranges from tawny yellow to rich golden brown, is a highlight of that season. Upon

unfolding in the spring the leaves are pink and velvety, soon changing to a glossy green as they develop to about four or five inches in length with the advent of summer. The under side of the leaves is a lighter green than the upper surface. They are borne alternate on the branches, are thin and deeply cleft into about seven lobes, each with one to four bristle-tipped teeth.

The trunk is generally short and massive and free of limbs for only about ten to twenty feet above the ground. Large, heavy limbs branching from the trunk form a broad, spreading, open, rounded crown. The bark on old trunks and the base of

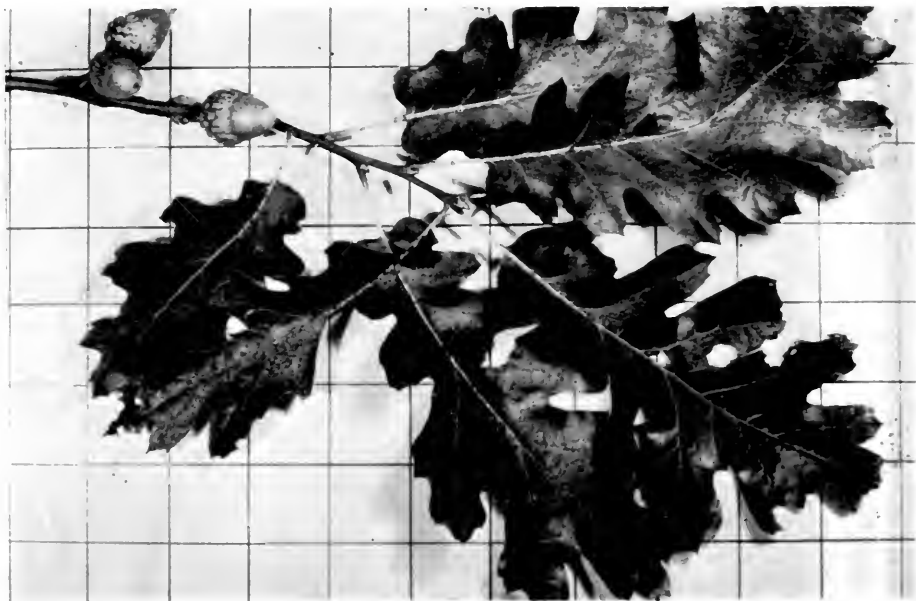


Photo by Brockman

Foliage and acorns of black oak (Inch squares on background)

large limbs is dark gray to black in color, hard, rough, and deeply furrowed. Small trees and the outer portions of larger limbs are characterized by bark that is smooth and of a dull gray-brown color. Year old twigs are smooth and red to reddish-brown. The buds are alternate on the twigs; and, in addition, are clustered at the tips, are ovoid to conical in shape and covered with numerous five-ranked scales. The leaf scars, moderate to small in size, are half round in outline and characterized by nearly a dozen vascular bundle scars arranged more or less in the form of an ellipse.

One of the most distinctive features of the California black oak are the acorns. These mature at the end of

the second season and are produced in abundance at intervals of from two to three years. They are one to one and one-half inches long, a pale chestnut in color, and are possessed of a tawny brown, scaly cup.

Acorns of this tree served as the principal source of food for the Indians of the area in the early days. They were pounded into coarse flour by the Indian women. Numerous mortar rocks, scattered about the Valley, are reminiscent of the original residents of this area since they are characterized by depressions brought about by that task. California black oak acorns are still gathered and utilized as food to some extent by a few of the older Indian residents of the Yosemite region.



Photo by Ansel Adams

Oaks on floor of Yosemite Valley

All oaks are wind pollinated. Thus these trees are rendered conspicuous in the early spring when, at about the time the leaves are beginning to develop, they are festooned with numerous loose, pendent, tassel-like staminate catkins which bear the abundant pollen.

Mature specimens of the California black oak are from 75 to 80 feet tall and one and one half to three feet in diameter. It is a moderately long-lived tree, attaining an age of about 300 years. Large trunks of old trees, however, are rarely sound. These are generally characterized by decayed centers and are often broken at the top. Such specimens often furnish

nesting sites for California woodpeckers and occasionally one will find a dead tree whose trunk and larger branches serves as a "storage bin" for these birds. In such instances these trunks are studded with holes in which acorns have been tightly wedged.

Another feature of interest relative to the California black oak is the abundance of mistletoe (*Phoradendron villosum*) found in these trees. This, a parasitic plant, appears as loose, bushy clusters, one to three feet in diameter, among the branches. It is particularly noticeable during the winter when the tree is barren of foliage.

CANYON LIVE OAK

***Quercus chrysolepis* Liebm. — Beech Family (Fagaceae)**

This tree is also known as the golden cup oak because of the handsome acorns, one-half to one and one-half inches in length, which are characterized by scaly cups densely covered with bright yellow wool. The acorns mature at the end of the second year, and while a few are produced annually, large crops are common only at infrequent intervals.

Several additional features render it of particular interest. It is one of the evergreen broadleaved trees of the Park and the leaves, which are alternate on the branches and oblong in outline (about three inches long) persist for three or four years. They have a thick, leathery texture, are smooth and yellow-green above, and when young are covered with yellowish down on the underside. They

vary considerably in size and appearance on trees of different age—in fact occasionally on parts of the same tree. Leaves of larger trees or older branches are generally smooth along the margin but young specimens, particularly vigorous shoots, bear foliage that has distinct spiny edges not unlike holly in appearance. This feature causes many park visitors to mistake young canyon live oaks for holly—a plant not found in the Yosemite region.

Mature specimens are generally from thirty to sixty feet tall with a short, heavy trunk two to three feet in diameter characterized by dark, flaky bark. Thick, heavy branches produce a wide spreading crown. However, this tree varies widely in size. In exposed locations at the

upper altitudinal limits of its range it assumes a scrubby character.

The canyon live oak is found between the 3,000 and 6,000 foot elevations. It thrives in protected canyon bottoms, a fact responsible for its common name, and has a particular affinity for the talus slopes and rock slides bordering such places. It is one of the most abundant trees in those places about Yosemite Valley and will be readily found along the lower parts of trails leading from the Valley floor to the rim—as in the case of the Yosemite Falls trail, the Four Mile Trail to Glacier Point, about Happy Isles, and along the trail from that point to Nevada Fall.

It is a slow growing but fairly long lived tree. Mature specimens attain an age of from 200 to 300 years.



Photo by Anderson

Typical trunk of canyon live oak

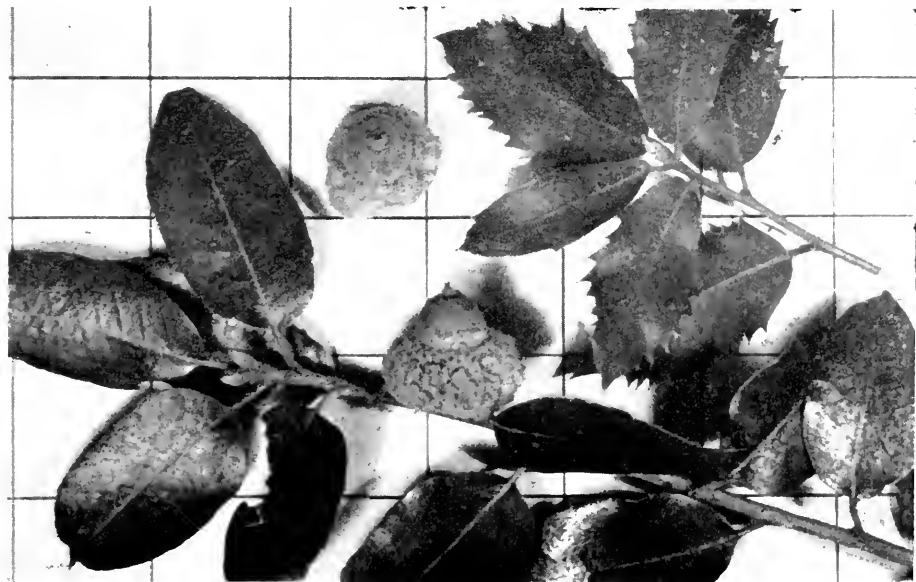


Photo by Brockman

Foliage and acorns of canyon live oak (Inch squares on background)

INTERIOR LIVE OAK***Quercus wislizeni* A. DC. — Beech Family (*Fagaceae*)**

This species is found in the foothills and open valleys along the western boundary of the park up to about the 2,000 foot elevation. It is an evergreen tree. The foliage is dense, shiny, and of a rich green color (yellow green on underside), with individual leaves being from one to three inches long, of leathery texture, and with the margins being either entire (smooth—not toothed) or characterized by spiny teeth. The acorns, one to one and one-half inches long at maturity, are generally conical, tapering at the apex, and enclosed at

the base by reddish-brown, scaly cups. The tree is usually from 30 to 50 feet tall and one to three feet in diameter, with a short trunk and wide spreading branches which produce a broad, rounded crown.

As it is very rare in Yosemite National Park it will not often be found in this area by the average visitor. However, it is abundant in the foothills to the west and will be readily noted along the approach roads to the park which pass through that region.

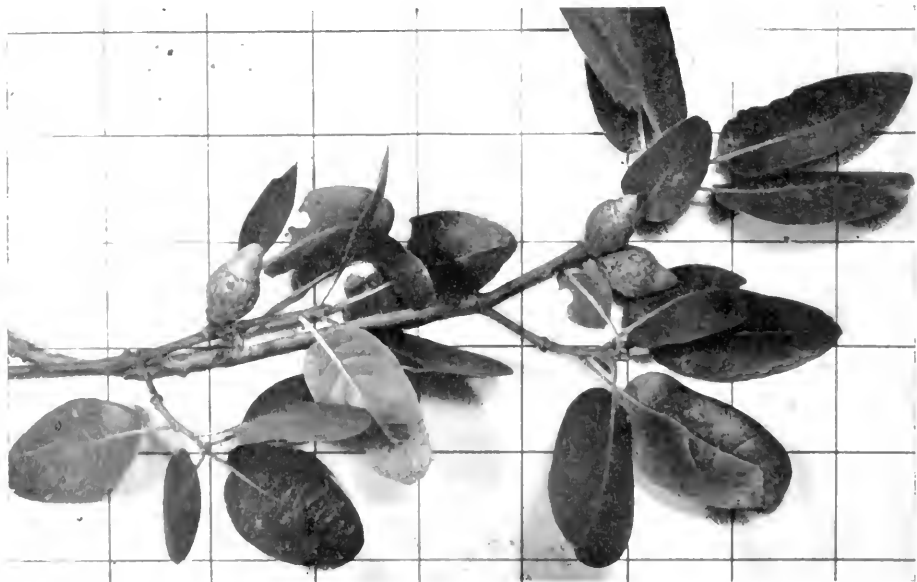


Photo by Brockman

Foliage and acorns of interior live oak (Inch squares on background)

BLUE OAK***Quercus douglasii* Hook & Arn. — Beech Family (Fagaceae)**

This tree is found in the foothills along the western boundary of Yosemite National Park up to about 2000 feet in elevation. It is characterized by the blue-green color of its foliage, which accounts for its common name, and the smooth appearing, light ash-gray, flaky bark. It is a small tree, averaging 30 to 50 feet in height and twelve to sixteen inches in diameter. The stout trunk bears thick branches which form a compact crown. The leaves are deciduous, dropping from the tree during the fall and winter of each year. They are

two to three inches long and one-half to two inches wide, and are quite variable in form for the margins are either entire (not toothed) or sinuately lobed (wavy).

As the blue oak is very rare in the park it will not be found by the average visitor in this area. Along the roads in the foothills to the west of the boundary, however, it is a common tree and can be readily noted as one approaches Yosemite National Park from any of the principal nearby towns in the San Joaquin Valley.



Photo by Brockman

Foliage and acorns of blue oak (Inch squares on background)

CALIFORNIA LAUREL

Umbellularia californica (Hook & Arn.) Nutt.—**Laurel Family (Lauraceae)**

This tree is rendered distinctive by the thick, glossy, short-stemmed, ever-green leaves which exude a penetrating, camphor-like odor when crushed. The leaves are alternate on the branches, three to six inches long, and from one-half to one and one-half inches wide at maturity. New leaves are produced throughout the summer and they persist on the tree from two to, occasionally, six years.

In Yosemite National Park the California laurel, which is also commonly known as pepperwood, California bay, and Oregon myrtle, is quite common in moist, rocky soils at the base of cliffs bordering canyons at elevations from 3,000 to 5,000 feet

above sea level. It may be readily noted along the highway above the Arch Rock Entrance as well as along the lower portions of many trails leading from the Valley floor to the rim.

It grows naturally along the Coast Ranges from southwestern Oregon, and inland from the Siskiyou in Oregon and the upper Sacramento Valley south along the Sierra to southern California at elevations varying from sea level (in the north) to 4,000 and 5,000 feet. In some parts of this range, particularly in southwestern Oregon where conditions are suited to its best development, it is an important broadleaved tree and

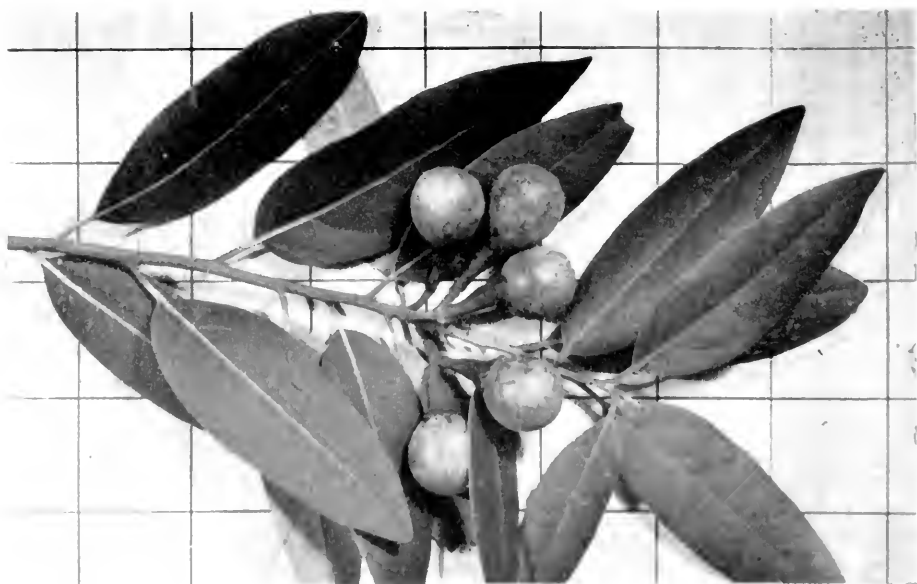


Photo by Brockman

Foliage and fruit of California laurel (Inch squares on background)

may reach three feet or more in diameter. However, in Yosemite National Park it is a small tree. Here, although larger specimens may be found, it is usually twenty to thirty feet tall and rarely more than six inches in diameter with erect, slender branches forming a loose, open, and narrow crown. It often takes the form of a many-stemmed shrub ten to fifteen feet tall — particularly in moist, shaded locations along streams in protected canyon bottoms. The bark, smooth on young trees and scaly on old trunks, is thin and varies from a

dull greenish-brown to reddish-brown in color. Smaller branches are light green in color.

Loose clusters of small, rather inconspicuous yellow flowers appear in the spring. The interesting, yellowish-green fruit — which resembles a large olive in appearance — is a conspicuous feature in the late summer and early fall. It consists of a large, thin-shelled, light brown seed surrounded by a thick, fleshy covering. It is ripe about October, at which time it drops from the tree.

WESTERN CHOKECHERRY

***Prunus virginiana* var. *demissa* (Nutt.) Torr. — Rose Family (Rosaceae)**

Although this species, which is found up to 5,500 feet, is not of great importance in the forests of Yosemite National Park; its dense, elongated

clusters of white flowers, or its fruit, often attracts the attention of Park visitors. In rich soil of protected locations it occurs singly or in small



Photo by Brockman

Foliage and flowers of chokecherry (Inch squares on background)

groups as a slender, crooked-stemmed tree from twenty to twenty-five feet tall. In drier, less desirable situations it sometimes forms shrubby thickets four to ten feet tall.

Although new twigs are green, the color of older bark is a light reddish-brown to gray, smooth, except on older and larger trunks, in which case it is rough and irregularly seamed with reddish-brown scales. The leaves which are one to three and one-half inches long at maturity are thick, somewhat leathery, and a deep green being shiny on the upper side and paler beneath. The edges of the leaves are characterized by numerous short teeth.

The attractive white flowers, each about one-half inch in diameter, are borne in compact, cylindrical clusters from two to four inches in length. Each cluster contains from 20 to 50 blossoms and on the Valley floor they are generally evident in June. By late summer the fruit ripens. However, this is eagerly sought after by birds and so it is generally devoured before it is fully ripe. When mature the fruit is characterized by a dark purple color.

Bruised twigs, leaves, and the bark of young twigs possesses a strong characteristic odor. The name choke-cherry is derived from the fact that the fruit has an astringent after taste.

KLAMATH PLUM

***Prunus subcordata* Benth. — Rose Family (Rosaceae)**

Although generally a stocky, crooked-stemmed shrub two to ten feet tall when growing in poorer soils, this species sometimes attains tree stature in locations suited to better development. In such cases it reaches a height of from 15 to 20 feet and attains a diameter of from four to six inches. It does best in sandy, fertile soils along stream borders and similar moist situations. In the Yosemite region it may be noted along the road in the Wawona area, about Big Meadows, and in the Hetch Hetchy section.

It is characterized by a short, thick trunk having ashy-brown, seamed bark. The limbs are heavy, extend at right angles from the trunk, and pos-

sess numerous short, stubby twigs. Twigs of the season are red to purple-red in color and are generally smooth. In the spring the tree bears white flowers about one-half inch in diameter, which appear just before or at about the same time as the leaves, in loose clusters of two to four. The leaves, when mature, are one to three inches long, almost circular in outline, and with numerous small teeth along the margin. The fruit is tart but edible, a deep purple-red in color, and about three-quarters of an inch to one inch long. Enclosed within the flesh of the fruit is a distinctive flat seed with a thin, keel-like edge along one side and a groove along the other.

BIGLEAF MAPLE***Acer macrophyllum* Pursh. — Maple Family (Aceraceae)**

This common tree can be readily recognized by even the most casual observer by its large, characteristic leaves. Although it may be found as high as 5,500 feet in elevation in Yosemite National Park, it is most common between 3,000 and 4,500 feet where it grows in moist, gravelly soils upon hillsides, in protected locations at the base of cliffs, or in the rich alluvial soils bordering streams. Its natural range includes an area along the Pacific Coast from southeastern Alaska to southern California.

Although it is not exceptionally large as a rule, it is a handsome tree. Mature specimens may attain a maximum of 80 feet in height and

two to two and one-half feet in diameter. When growing in the open the large, heavy branches produce a broad, spreading, round-topped crown densely covered with foliage. In less favorable situations it is characterized by a more ragged, less pleasing appearance. New twigs are smooth and green, while larger branches have a pale grey or reddish-brown color. Gray to reddish-brown bark with hard, scaly ridges characterize the trunks of larger trees. Although it grows rapidly at first its rate of growth decreases with age. It reaches maturity in about 200 to 300 years.

The foliage is unmistakable. Borne on stems four to six inches long, the



Photo by Brockman

Foliage and seeds of bigleaf maple (Inch squares on background)

large leaves, which may occasionally be more than twelve inches across, are especially noteworthy. They are borne opposite on the branches, are smooth and shiny green above, pale green below, and palmately divided into five broad lobes.

Although the foliage of some of the eastern maples assume vivid hues before dropping from the tree in the fall, such is not the case with this western species. In autumn the color of its foliage is not particularly attractive, being generally characterized by dull brownish to yellow shades. However, this maple has other interesting features, not the least of which are the large, pendent clusters (racemes) of fragrant yellow flowers which enliven the appearance of the tree during the early spring when

the leaves are unfolding. These clusters, which include both staminate (male) and pistillate (female) flowers, are from four to six inches long. Insects, which are attracted in great numbers to these flowers, serve to pollinate the blossoms. The characteristic fruit—a pair of nut-like seeds, each attached to a large blade-like wing—is fully developed by July. At that time they are about one to two inches long. Their green color, typical of midsummer, changes to a light brown in the early fall.

The bigleaf maple can be recognized in winter by the stout twigs with their opposite leaf scars. The leaf scars are rather large, V-shaped or U-shaped in outline, upon which are from five to nine vascular bundle scars.

ROCKY MOUNTAIN MAPLE

***Acer glabrum* Torr. — Maple Family (Aceraceae)**

Although this species will be most generally noted as a tall shrub, the Rocky Mountain or dwarf maple occasionally attains the stature of a small tree, reaching a height of ten to fifteen feet and a diameter of three to four inches. It generally occurs in moist but poor gravelly to rocky soils in protected canyons and gulches up to about the 7,000 foot elevation. Hikers using the Ledge Trail will find it common in such situations along that route.

The leaves, borne opposite on the branches, have slender stems one to five inches long, are one to three in-

ches across, rather conspicuously veined, and are dark green and shiny upon the upper surface (paler below). They are three (occasionally five) lobed, with the edges of the lobes coarsely toothed. The stems of the leaves are occasionally red.

The winged seeds, which are about one inch in length, are borne in pairs. Before maturity they are a bright rose-red in color, changing to russet-brown before they ripen in late summer or early fall.

The trunk possesses smooth, reddish-brown bark with a slight gray tint. Mature twigs are reddish-brown.

PACIFIC DOGWOOD***Cornus nuttalli* Audubon — Dogwood Family (Cornaceae)**

This is one of the most attractive of Yosemite trees. Its beauty in the spring, when it is characterized by great numbers of large, showy, cream-white blossoms, vies with its attractiveness in the fall. At the latter season it is outstanding because of the brilliance of its crimson foliage and clusters of shiny red seeds. It has long been a highlight of interest in Yosemite National Park at those times, and many people make special trips to this area on such occasions primarily to enjoy the colorful spring and fall dogwood display.

Although it is occasionally found as high as 7,000 feet it is most generally noted at lower elevations. It is partial to moist, well-drained soils of mountain slopes and protected loca-

tions in valley bottoms. One will note it in abundance along the Wawona Road, and along the Big Oak Flat Road, as well as in many sections of Yosemite Valley. In the latter place it can be most readily found about Happy Isles, in the vicinity of Fern Springs, and about the Pohono Bridge.

The Pacific dogwood is not a large tree. Mature specimens attain a height of from twenty to fifty feet and a diameter of from ten to twenty inches. The trunk is generally straight and characterized by smooth, thin, dull gray bark. The crown is narrow and is composed of short branches. As it is intolerant of dense shade the crown, when the tree is growing in the dense forest, is short while the trunk is long and clear.

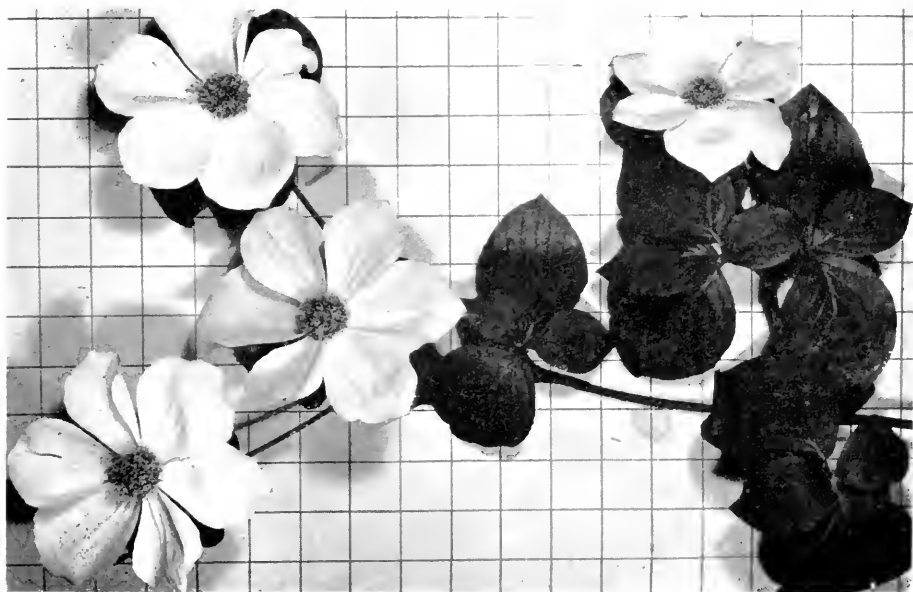


Photo by Brockman

Foliage and flowers of dogwood (Inch squares on background)

The leaves are borne opposite upon the branches. They are from three to five inches long with the midvein and its branches conspicuously impressed upon the upper side. Numerous small, greenish-white flowers are borne in button-like clusters which are about one and one-half inches in diameter. These are surrounded by four to six showy, cream-white scales or bracts, often improperly regarded as "petals"—the entire flower cluster being thus considered as one flower. However, this is not the case. As stated, the flowers—possessing only stamens and pistils—are clustered in the center "button." The showy scales which surround the flower cluster are, like the flower cluster, partially formed during the previous summer. They remain in this state until the



Photo by Anderson

Pacific dogwood in early spring

following spring when they develop fully along with the flowers.

These showy, cream-white scales soon wither and drop from the tree and by midsummer the formation of the seeds, which vary from twenty-five to forty per cluster, is well advanced. Although green at first, they change to a brilliant red by fall—usually in October.

The natural range of this attractive tree includes a considerable area of the Pacific west—from Vancouver Island and the Fraser River valley in British Columbia south through western Washington and Oregon to the San Bernardino Mountains of southern California—as well as along the west slope of the Sierra Nevada between 4,000 and 5,000 feet above sea level.



Photo by Brockman

*Foliage and fruit of dogwood
(Inch squares on background)*

CALIFORNIA BUCKEYE

***Aesculus californica* (Spach.) Nutt. — Horse chestnut Family
(Hippocastanaceae)**

Being native to the upper Sonoran Zone (1,000 to 2,500 feet), this tree is found only occasionally within park boundaries. It may be noted in the vicinity of the Arch Rock Entrance and at points along the western park boundary to Hetch Hetchy. Motorists journeying to the park will note numerous specimens along the highway bordering the Merced Canyon to a point in the vicinity of El Portal, along the road from Fresno to a point above Coarse Gold, and in places along highway No. 120.

While it often occurs as a shrub,

ten to twenty feet tall with several stems arising from a common root, it also attains the stature of a small tree up to twenty five feet tall and a diameter of from eight to twenty inches. Its foliage, flowers, and fruit are all distinctive and these features enable one to identify it quickly and easily.

The large, long stemmed leaves which are borne opposite upon the branches are palmately compound, generally with five but occasionally with four to seven leaflets, each from three to seven inches long. When ma-



Photo by Anderson

California buckeye in fall with distinctive fruit

ture they are bright green and smooth except for minute hairs in the angle of the veins on the pale under surface. The edges of the leaflets are characterized by numerous teeth.

In the spring this tree is conspicuous because of its showy flowers. These vary in color from white to a delicate pink and are produced in large, erect clusters up to six inches long. It is also conspicuous in the fall after the foliage has been shed. At that time the large, green, pear-shaped fruit, two to three inches long, can be seen hanging from the tips of the branches. Closer examination will reveal that the fruit consists of a large, glossy brown seed, sometimes

nearly two inches across, enclosed in a thin husk of leathery texture which splits open upon maturity. Only rarely is more than one buckeye enclosed within one husk.

Although considerable effort was required in the preparation of the buckeye as a food due to its bitter taste, it was so used on occasion by the Indians which inhabited the lower foothills. This was particularly the case at times when the acorn crop failed. In addition the soft, light, close grained wood was utilized, after careful seasoning, by the Indians in the preparation of equipment for making fire by friction.



Photo by Anderson

North Dome and the Merced River in Winter

OREGON ASH***Fraxinus oregana* Nutt. — Olive Family (Oleaceae)**

This is a rare tree in the Yosemite region and it will probably not be noted within park boundaries by the average visitor. However, it is occasionally found along the western boundary in the vicinity of El Portal, and may be seen along the All Year Highway in that area, growing in moist soils along streams.

It is usually a crooked tree and rarely attains a size greater than twenty-five feet in height and six to ten inches in diameter. The bark is thick and soft, deeply furrowed and

grayish-brown in color. The leaves are opposite on the branches, six to twelve inches long and compound—with from five to seven leaflets. These leaflets are each from one-half to one and one-half inches wide, oval in outline and often toothed above the middle.

Male and female flowers are borne on separate trees and appear before the leaves. The fruit, consisting of a small seed with an elongated wing, is borne in clusters and is from one to two inches long.



Photo by Brockman

Foliage and seeds of ash (Inch squares on background)

INTRODUCED TREES IN YOSEMITE NATIONAL PARK

Visitors to Yosemite National Park will note a number of interesting trees which were planted in the early days before this area became a national park (1) and which, although they are not native to this area, have been allowed to remain because of their association with the early history of the region. In this category fall the American elm, the black locust, and sugar maple, found in a number of places on the Valley floor, as well as several kinds of fruit trees.

The latter are, perhaps, the most conspicuous and best known of these introduced trees. With few exceptions they are apple trees and, insofar as the valley is concerned, are contained primarily in three orchards (2). One of these is included within the parking area near Camp Curry, a second will be noted in the meadow just east of the Yosemite Park and Curry Co. stables, and a third is in the vicinity of the Yosemite Park and Curry Co. utility area near the road between Yosemite Lodge and Government Center.

The first two orchards were planted by James C. Lamon, the first settler

in Yosemite Valley. He arrived here in June 1859, located a pre-emption claim of 160 acres in the fall of that year and built a small cabin of logs near the present Yosemite Park and Curry Co. stables. His two orchards were planted soon after. Today they are composed almost entirely of apple trees, although one pear tree can be found in the orchard near the stables. Apparently, in the early days they contained plum and peach trees as well (3). The orchard near the Company utility area was planted by James Mason Hutchings who had returned to the Valley in 1864 as a hotel owner (4). This orchard adjoined his residence, which he constructed on the north side of Yosemite Valley a few years later. Although the Hutchings residence was eliminated many years ago the orchard still remains. It consists mostly of apple trees, but a few cherry trees will also be found.

Hutchings also planted a row of American elms along the route of the present road that crosses the meadow north of the present Sentinel Bridge. These were grown from seed supplied by Rev. Joseph Worcester

(1) The Yosemite Valley area and the Mariposa Grove of Giant Sequoias—originally known as the Yosemite Grant—was entrusted to the State of California by the Federal Government in 1864. Yosemite National Park, which included an area surrounding Yosemite Valley, was established on October 1, 1890. In 1906 the two areas comprising the original Yosemite Grant were ceded to the Federal Government by the State and incorporated into Yosemite National Park.

(2) Apple trees will also be noted in the Wawona area. According to Mr. Ed. Gordon, old time Wawona resident, the apple orchard in that section was planted in the early days of George Conway. In addition to the orchard a few apple trees will be found in the rear of the Wawona hotel, as well as in the vicinity of the spring west of the meadow. These were planted by the Washburn Brothers about sixty year ago.

(3) See Taylor, Mrs. H. J. Yosemite Indians and Other Sketches; San Francisco, California, Johnck and Seeger, 1936. pp. 15-26.

of Waltham, Massachusetts (5). Of these trees only one remains. It can be found near the road intersection on the north side of the Valley opposite the Sentinel Bridge.

American elms as well as black locusts will also be noted in the Old Village. Trees of the latter species will also be found in the pioneer cemetery (near the Park Museum), in the vicinity of Camp Curry, and along the highway near the start of the Four Mile Trail. The black locusts in the latter place are reminders of the period in Yosemite history when that area was an important public center in the Valley (6). In addition two sugar maples will be found in the Old Village just east of the general store (7).



Photo by Anderson

American elm and black locust in Old Village

(4) In June 1855 James Mason Hutchings, contemplating the publication of his "California Magazine," visited Yosemite Valley with several companions—among them the artist Thomas Ayres—for the purpose of gathering data and making sketches for publication. This is credited with being the first "tourist visit" to the Valley, since it was prompted wholly by interest in its scenic values. Several earlier journeys had been made to the region but the principal interest in such cases had been that of pursuing Indians, following the Indian trouble of 1850-51, or prospecting. It was from the meager reports of these earlier expeditions that Hutchings' interest was aroused.

From the time of his first visit Hutchings always had a deep affection for Yosemite. In 1864 he purchased the "Upper Hotel" (constructed by Beardsley and Hite in 1857-59), which was located on the south side of the road opposite the present Sentinel Bridge, and rechristened it "Hutchings House." It was later to become famous as Cedar Cottage, a name applied due to the fact that one of the many additions to the original structure was constructed about a large California incense cedar. See Russell, C. P. 100 Years in Yosemite; Stanford University Press; 1931, pp. 99-125.

(5) See Hutchings, J. M. In The Heart of the Sierras; Pacific Press Publishing House, Oakland, California; 1886, pp. 134-138.

(6) In 1856 Walworth and Hite undertook the construction of the first building designed to serve the needs of early visitors to Yosemite Valley. It occupied a site at the base of Sentinel Rock near the start of the present Four Mile Trail to Glacier Point. Completed in 1857, it thus became the first hotel in this area. In 1869 this original structure was dismantled by A. G. Black who utilized the site in the construction of a new hotel. In the same year G. F. Leidig constructed another hotel nearby. Originally the Yosemite Chapel, built in 1879, occupied a place in this area, and the Guardian of the Yosemite Grant was located here for a time. In 1888 all these buildings were razed, with the exception of the Chapel which was moved to its present site in the Old Village.

(7) These trees mark the site of the photographic studio, operated by Mr. and Mrs. J. T. Boysen, which was located at that point for many years. From information received from Mrs. Ellen St. Clair—daughter of Mr. and Mrs. Boysen—these trees were planted in 1902, 1903, or 1904 from stock received from Vermont.

These "outsiders" of the original generation remain among the natives by sufferance. It is the policy of the National Park Service to eliminate in so far as possible all exotic plants and animals which may gain a foothold in the national parks, but these living relics of pioneer days in Yosemite Valley may remain until Nature deals the inevitable death blow. They will

not be replaced except by their scattered progeny which may escape the watchful eye of the forester. In time, even the scattered progeny will succumb to Nature's control.

For those visitors who may wish to seek and identify the American elm, the black locust, and the sugar maple in Yosemite Valley, a description of these species follows.

AMERICAN ELM

***Ulmus americana* L. — Elm Family (Ulmaceae)**

This is one of the most noble and stately of native American trees. Its natural range includes a large part of the eastern United States and Canada — from Newfoundland south to central Florida, and westward to Manitoba and eastern Texas. It is one of the most familiar of trees in the New England states, and it was

from that region (Massachusetts) that the seed which was planted by Hutchings was secured. (See page 30).

Since it grows best in rich, moist, alluvial soil in its native habitat, it found in Yosemite Valley a suitable environment. Many of the trees planted here now are quite large and compare favorably with those

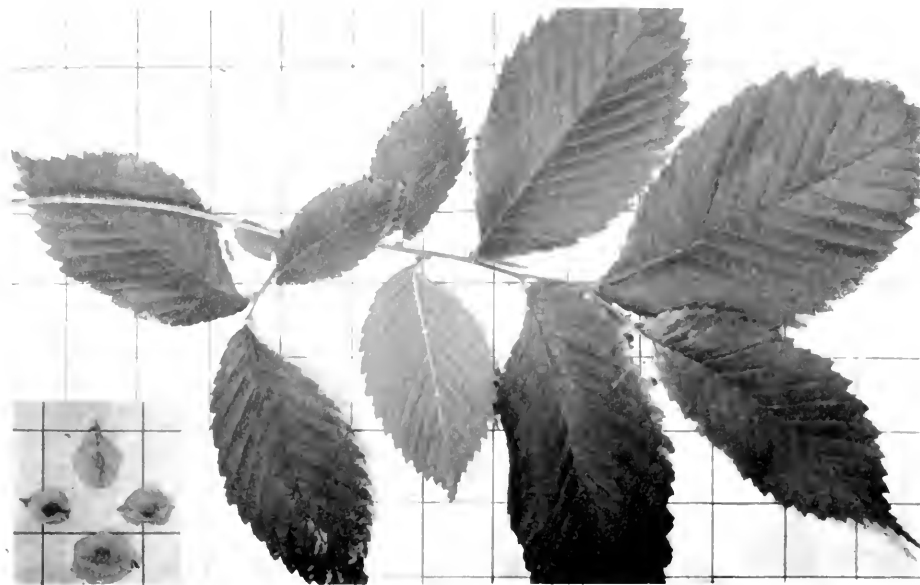


Photo by Brockman

Foliage and seeds of American elm (Inch squares on background)

in the east. Local elms are one and one-half to two and one-half feet in diameter and from fifty to seventy-five feet tall. The trunk, characterized by dark, ash-gray bark, divided into numerous flaky ridges, separate into several large branches, ten to fifteen feet above the ground, to form a tall, graceful, vase-like crown. The flowers are produced in abundance in loose clusters, usually early in May, and the seeds are fully ripened before the leaves are completely formed. The seeds are small, flat, and completely surrounded by a thin, papery wing—seed and wing being about one-half to three-quarters of an

inch in diameter. In the late spring they are found in great abundance on the ground in the vicinity of these trees.

The deep green leaves are alternate on the branches, oblong in outline (about three to five inches long and one to five inches wide), tapering to a point at the apex. They appear lopsided due to the inequilateral nature of the base and are coarsely and doubly toothed along the margins. Prominent veins extend from mid-rib to the leaf margin. Their upper surface is coarse and rough to the touch, while underneath they are smooth but slightly hairy.

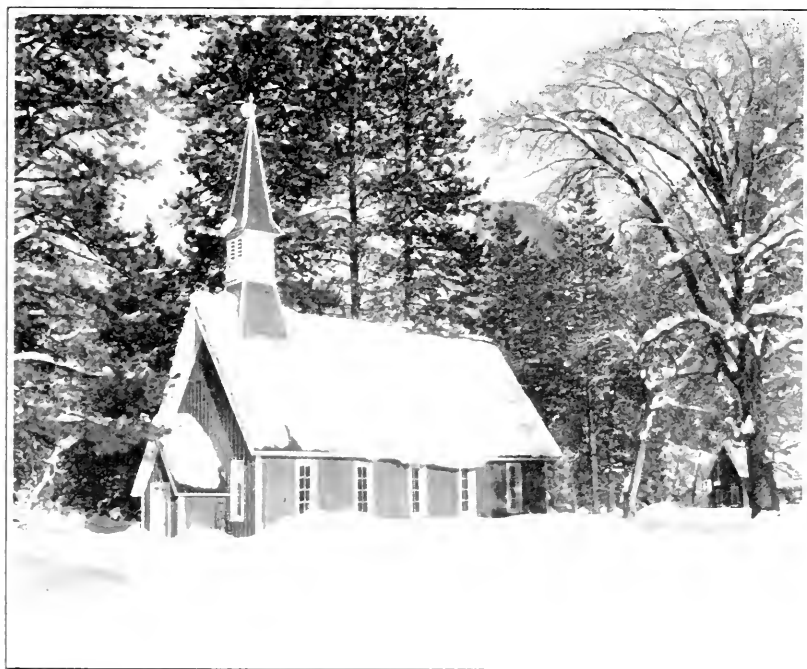


Photo by Ansel Adams

Yosemite Chapel in Old Village. Location of numerous introduced trees.

BLACK LOCUST***Robinia pseudoacacia* L. — Pea Family (Leguminosae)**

Although native primarily to the Appalachian Mountain area, this tree has been widely planted throughout many parts of the United States. Yosemite Valley was no exception and those planted here during the early days are now good sized trees. They vary from six to fifteen inches in diameter and, in some cases, are from fifty to sixty feet high.

The black locust can be easily recognized by the alternate, odd-pinnately compound leaves, which are from eight to fourteen inches long, and which bear seven to nineteen sub-opposite rounded leaflets, each one and one-half to two inches long.

As this tree is a member of the Leguminosae or pea family its flowers and seed pods are characteristic of that group of plants. The handsome white clusters of pea-like flowers appear on the trees in June. Seeds, borne in elongated, dark brown, bean-like pods which are two to four inches long, are mature by late summer or early fall.

The trunk of this tree is short, dividing but a little way above the ground into a number of stout branches to form an open crown. The bark is dark reddish-brown in color and deeply fissured—the numerous ridges having a characteristic twisted or

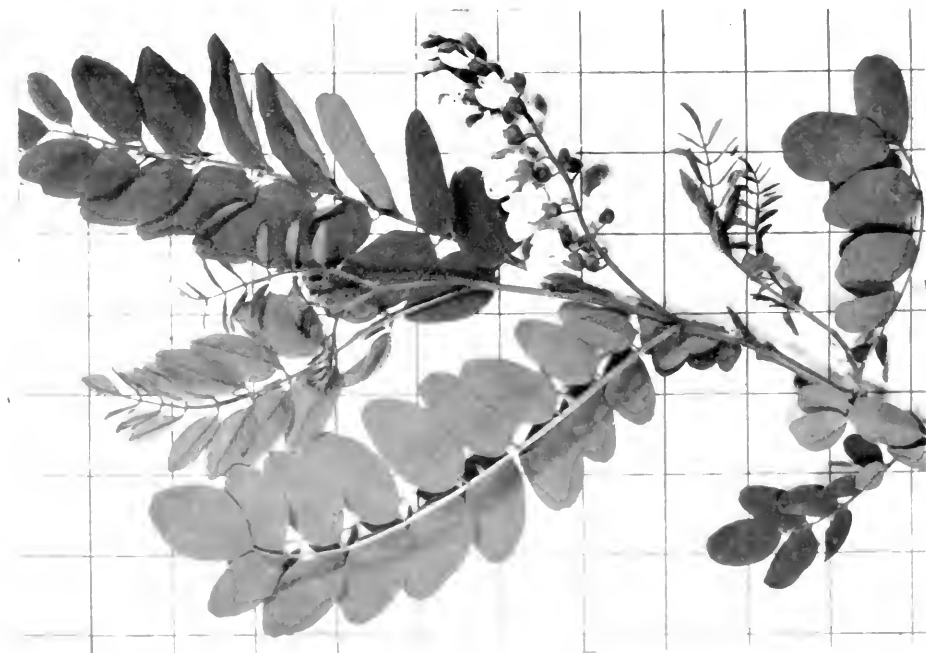


Photo by Brockman

Foliage and flowers of black locust (Inch squares on background)

"ropey" appearance. The branches are characterized by the presence of numerous stout, short spines or prickles.

SUGAR MAPLE

***Acer saccharum* Marsh — Maple Family (Aceraceae)**

This is an important tree of the eastern states. It is, perhaps, best known for the maple syrup which is derived from the sap taken from the trees in certain sections of its natural range — particularly in the "sugar bush" of New England. The two specimens of sugar maple found in Yosemite Valley have not been so used.

While the locally introduced sugar maples can be readily identified as maples due to the distinctive foliage, they are rarely recognized as distinct from the bigleaf maple which is native to this region and which is present here in relative abundance (see page 23). These two species are superficially alike in general appearance, the principal differences between the two being found in the leaves and the flowers. Although having relatively the same form, the leaves of the sugar maple are considerably smaller — being a maximum of from three to five inches in width as compared to the much larger sized leaves of the bigleaf maple. The flowers of the sugar maple (greenish yellow and appearing at the same time as the leaves) are borne in corymbs, that is in loose clusters with the long stems of the flowers having a common point of

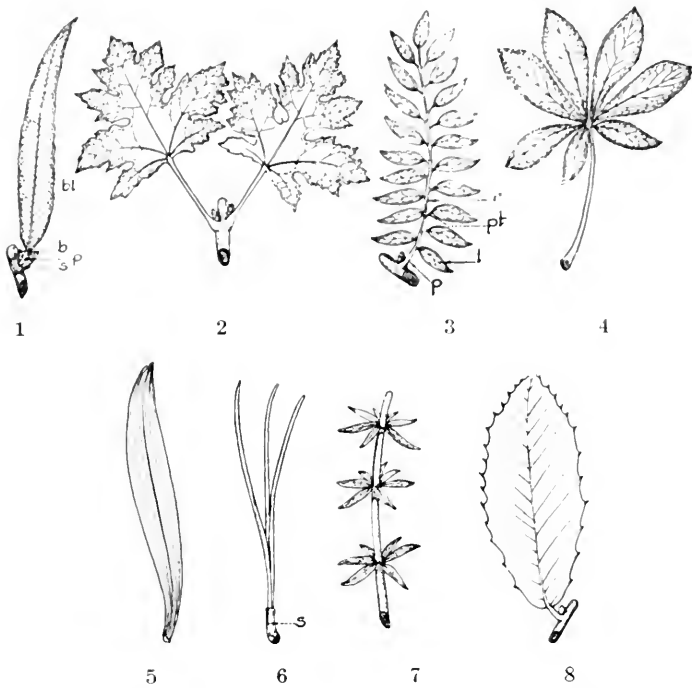


Photo by Anderson

Trunk detail of sugar maple

attachment on the twig. This arrangement is quite different from that of the bigleaf maple—its flowers are in racemes, elongated clusters with the flowers being borne upon short stems attached to a central axis.

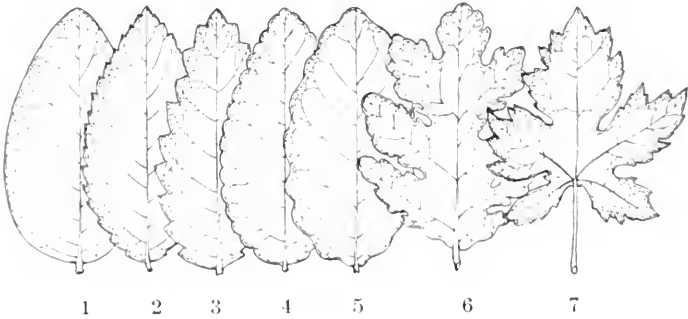
The two sugar maples found just east of the general store were planted about 1902, 1903 or 1904. They are about fourteen inches in diameter and fifty feet tall.



From McMinn and Mann: *Pacific Coast Trees*. Courtesy of the University of California Press.

Parts, kinds, arrangements, and venation of leaves

1. Stem with simple alternate leaf, with netted venation; b, bud; bl, blade; p, petiole; s, stipules. 2. Stem with opposite, palmately veined and lobed leaves. 3. Pinnately compound leaf; l, leaflet; p, petiole; pt, petiolule; r, rachis. 4. palmately compound leaf. 5. Simple leaf with parallel venation. 6. Fascicled leaves; s, sheath. 7. Stem with whorled leaves. 8. Straight-veined leaf.



From McMinn and Mann: *Pacific Coast Trees*. Courtesy of the University of California Press.

Margins of Leaves

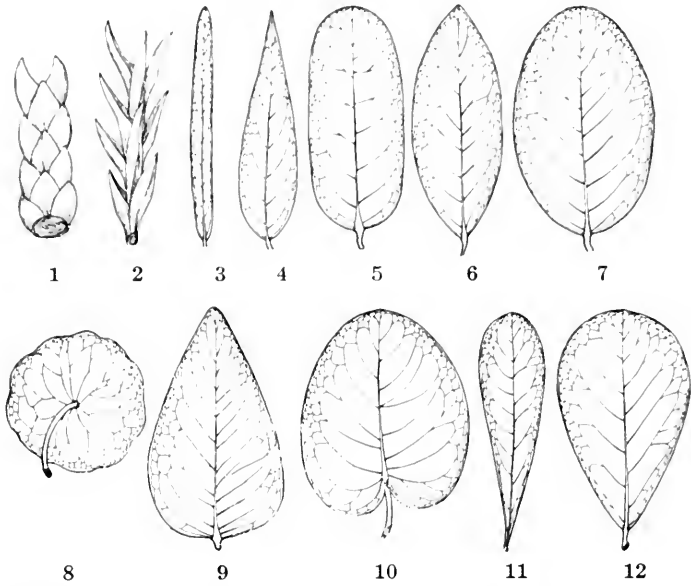
1. Entire. 2. Serrate. 3. Dentate. 4. Crenate. 5. Sinuate. 6. Pinnately lobed. 7. Palmately lobed.

FIELD KEY TO THE BROADLEAVED TREES OF YOSEMITE NATIONAL PARK

This key considers only the gross characters of trees in question which can be readily noted by the layman. It is of the dichotomous type (regularly branching in pairs). Beginning with No. 1 on the left one merely selects the character which fits the tree which is being studied. One is thus referred to the next pair of possibilities by the number noted on the right. Continuing in that manner the observer finally eliminates successive distinguishing characters until the identity of the tree noted is given.



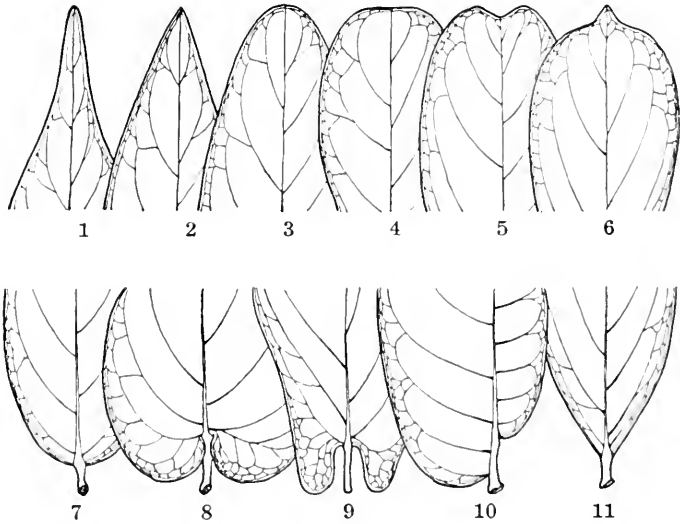
1. Leaves alternate 2
1. Leaves opposite 14
 2. Foliage evergreen 3
 2. Foliage deciduous 5
3. Margins of leaves not toothed; leaves with pungent odor when crushed. Fruit green and olive-like **California laurel** (see page 20)
3. Margin of leaves often toothed and holly-like in appearance; fruit an acorn 4
 4. Cup of acorn covered with bright yellow "wool." Found from 3,000 to 6,000 ft.; common in rocky soils bordering cliffs **Canyon live oak** (see page 16)
 4. Cup of acorn not wooly but scaly; acorn conical. Found up to 2,000 ft.; very rare in park **Interior live oak** (see page 18)
5. Leaves pinnately compound with from 7 to 19 subopposite rounded leaflets; flowers white, in clusters and pealike; fruit a pod with several seeds; twigs with short spines. An introduced tree **Black locust** (see page 34)
5. Leaves simple, not compound 6
 6. Leaves large and deeply cleft into about seven lobes, each with four bristle-tipped points; fruit an acorn. **California black oak** (see page 14)
 6. Leaves not deeply cleft 7
7. Margin of leaves not toothed or sinuately lobed (wavy). Fruit an acorn. Found occasionally up to 2,000 ft.; very rare in park **Blue oak** (see page 19)
7. Fruit not an acorn and foliage not as described above 8
 8. Leaves narrow and elongated **Willows** (see page 6)
 8. Leaves not as noted above 9
9. Leaves more or less triangular in outline; broadest at base and tapering to a point at apex 10
9. Leaves not as noted above; either ovate, oblong, or round in outline 11
 10. Leaves large, 2 to 7 inches long, margins finely toothed, thick and leathery in texture, shiny green above and pale green to silvery beneath. Bark heavily ridged and dark gray on large trunks; pale gray on young trees. Common in moist soils up to 4,500 feet. **Black cottonwood** (see page 7)
 10. Leaves 1½ to 3 inches long, roundly tapering to a point at the apex; margin of leaf with small teeth; stem or petiole of leaf long and flattened from the side, causing foliage to flutter in slightest breeze. Bark generally smooth and white. Not found below 5,000 feet **Quaking aspen** (see page 9)



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Shapes of leaves

1. Scale-like. 2. Awl-shaped. 3. Linear. 4. Lanceolate. 5. Oblong. 6. Elliptic. 7. Oval. 8. Orbicular. 9. Ovate. 10. Cordate. 11. Oblanceolate. 12. Obovate.



From McMinn and Maino: Pacific Coast Trees. Courtesy of the University of California Press

Tips and bases of leaves

1. Acuminate. 2. Acute. 3. Obtuse. 4. Truncate. 5. Emarginate. 6. Mucronate. 7. Rounded. 8. Cordate or heart-shaped. 9. Auriculate. 10. Oblique or unequal. 11. Cuneate or wedge-shaped.

11. Leaves circular or almost so; margin with small teeth. Attractive white flowers approximately one inch in diameter. Fruit ($\frac{3}{4}$ to 1 inch long) deep purple-red in color and tart to taste
Klamath plum (see page 22)
11. Leaves not circular but ovate (widest below middle) or oblong in outline 12
12. Margin of leaves coarsely toothed; prominent veins extending to leaf margins..... 13
12. Margin of leaves finely toothed; leaves oblong in outline. White flowers (in spring) borne in compact, elongated clusters. Fruit a blackish berry.
Western chokecherry (see page 21)
13. Leaves ovate in outline (1 to 2 inches wide, 2 to 3 inches long). Staminate flowers, common in spring, in elongated pendent, tassel-like catkins. Seeds borne in small, distinctive, green (black after maturity) "cones." Bark steel gray in color and usually smooth. Common along streams
White alder (see page 12)
13. Leaves oblong in outline (1 to 3 inches wide, 3 to 5 inches long), doubly toothed on margin, and lopsided at base. Flowers produced in loose clusters before unfolding of leaves. Seeds flat and entirely surrounded by thin, papery wing. Bark dark gray and ridged. An introduced tree
American elm (see page 32)
14. Leaves compound 15
14. Leaves not compound 16
15. Leaves palmately compound with five to seven leaflets, each three to seven inches long. Flowers in showy, white, elongated clusters. Fruit a buckeye. Rare in park but common along approach roads to park from San Joaquin Valley.
California buckeye (see page 27)
15. Leaves pinnately compound. Seeds with elongated wings, borne in bunches. Very rare in park but found along lower parts of western park boundary; will be noted in vicinity of El Portal
Oregon ash (see page 29)
16. Leaves "maple-like", palmately divided into three to five lobes; winged seeds produced in pairs 17
16. Leaves not divided; oblong in outline. Large white blossoms conspicuous in spring; clusters of bright red seeds conspicuous in fall
Pacific dogwood (see page 25)
17. Leaves small, one to three inches wide; leaf stems occasionally red; winged seeds rose-red before maturity, changing to russet brown, about one inch long. Usually a tall shrub in gravelly to rocky soils in protected locations
Rocky Mountain maple (see page 24)
17. Leaves larger than above at maturity. Seeds larger. Flowers yellow-green in color..... 18
18. Leaves large, sometimes twelve inches wide; fragrant yellow flowers in pendent, compact clusters (racemes). Seeds large, one to one and one-half inches long including the wing. The common maple of this region.
Big leaf maple (see page 23)
18. Leaves 1 to 3 inches wide at maturity; yellow-green flowers in loose, open clusters (corymbs). Seeds, including wings, rarely longer than one inch. Uncommon introduced tree
Sugar maple (see page 35)

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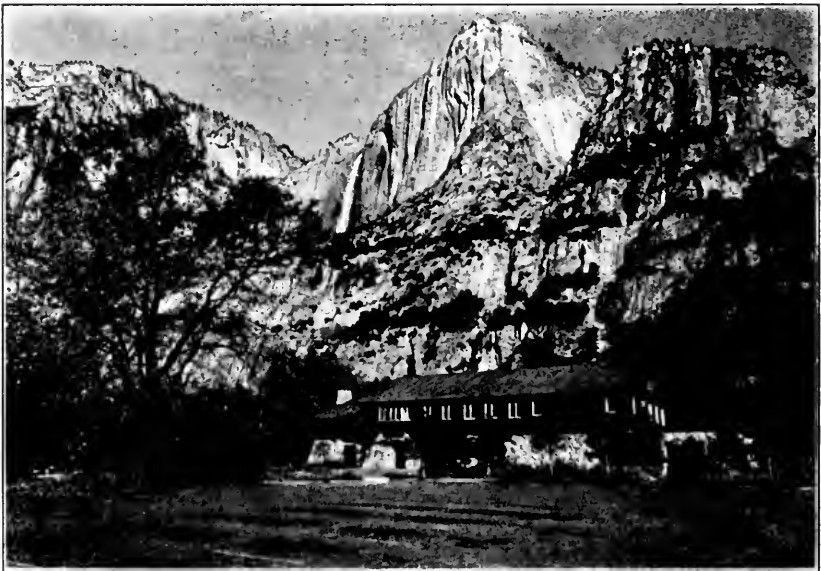


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